Operation/Reference Guide

Anterus™

RFID Solution

ANT-RDR Reader
ANT-BDG Badge
ANT-TAG Device/Asset Tag

Control System Accessories

Last Updated: 10/22/2008

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Anterus™ RFID Solution

Overview

The Anterus™ RFID Solution provides a Radio Frequency IDentification (RFID) solution from AMX that extends the capabilities of the integrated A/V or control system. Anterus provides the ability to monitor devices for asset control, as well as to define control system functionality based on the presence of an RF Tag.

ANT-RDR Readers interface to the NetLinx Master via the AXLink bus. Anterus Tags actively send RF messages communicating their information to ANT-RDR Readers at a distance. By design, the Tags are active at all times. The ANT-RDR filters RF messages to ensure only messages from RF Tags in the AMX system are forward to the control system.

- Each ANT-RDR Reader detects Anterus RF Tags within its monitored zone of up to 100 feet (30 m).
- Anterus products are designed to not interfere with WiFI and Zigbee frequency spectrum used by other AMX products

The Anterus RFID Solution is intended for asset tracking and system control. It is not to be used as a primary asset or personnel security system.

Anterus components include:

- **ANT-RDR** Reader (FG5172): The ANT-RDR connects to the NetLinx controller to initiate system events when an Anterus RF asset tag or ID badge passes into its zone. See the *ANT-RDR RFID Reader* section on page 2 for product details.
- **ANT-TAG** Device/Asset Tag (FG5172-01): The ANT-TAG device/asset tag attaches to devices to identify and track their location and trigger system events. See the *ANT-TAG Device/Asset Tag* section on page 5 for product details.
- **ANT-BDG** Badge Tag (FG5172-03): The ANT-BDG badge tag is worn by personnel to identify them, track their location within a facility, and trigger system events while in proximity to an Anterus reader. See the *ANT-BDG ID Badge Tag* section on page 6 for product details.
- **Anterus Duet Module**: The Anterus Duet Module interfaces ANT-RDR Readers with NetLinx controllers. See the *Programming* section on page 27 for details.

FIG. 1 Anterus RFID Group

ANT-RDR RFID Reader

The ANT-RDR (FG5172) connects to the NetLinx controller to initiate system events whenever an ANT-TAG Device/Asset tag, or ANT-BDG ID badge passes into its zone (FIG. 2).

FIG. 2 ANT-RDR RFID Reader

- The ANT-RDR communicates with the NetLinx Master via AXLink, which supports up to 255 devices on a single AXLink bus spanning for a total distance of 3000 feet (915 m).
- The ANT-RDR uses a 4-pin 3.5 mm mini-Phoenix (male) connector to provide data and power to the ANT-RDR via the AXLink bus.

NOTE

AXLink supports multiple topologies including Star, Daisy-Chain, or a combination of both Star and Daisy-Chain.

ANT-RDR Product Specifications

The following table provides product specifications for the ANT-RDR Reader:

ANT-RDR Specifications	
Front Panel Components:	• RF Status LED (red): Indicates reception from RFID tag. • AXLINK Status LED (green): Blinks to indicate the device is installed and communicating properly. Solid ON = Power on, but no master connection. Solid OFF = No power • RF Stub Antenna (433.92 MHz)
Rear Panel Components:	• AxLink connector - 4-pin 3.5 mm mini-Phoenix (male) connector provides data and power to the ANT-RDR. • DEVICE ID 8-position DIP Switch - Used to set the unique binary device number. The device number is set by the total value of DIP switch positions that are ON (down).
RF Specifications:	• Transmission Frequency: 433.92 MHz • Transmission Range: Up to 100 feet/30 meters (adjustable) ***Note**: Tag and Reader communication distances assume optimal orientation between Tag and Reader. Read distances may also vary as a result of the presence of metal and environmental conditions.*
System Limitations:	• Up to 30 ANT-RDRs per system • Up to 250 tags (ANT-TAG or ANT-BDG) per ANT-RDR
Power Requirements:	• 780 mW; ±12 VDC, 90 mA (max.) • Power provided by 4-pin AxLink connector.
Environmental:	• Operational temperature: 32° F to 140° F (0° C to 60° C) • Storage temperature: -4° F to 158° F (-20° C to 70° C) • Humidity: 5% to 90% (non condensing)
Enclosure:	Black Metal Powder coat
Dimensions (HWD):	• .906 x 2.500 x 3.424 (23.01 mm x 63.50 mm x 86.96 mm) • Does not include antenna.
Weight:	4 oz. (113.4 grams)
Certification:	The following standards applied in accordance with Article 5 of the directive, 1999/5/EC: • EN 300 220-1 V1.2.1 (1997-11) • ETS 300 683 (1997-03)
Other AMX Equipment:	• AC-DIN-EXTR DIN Rail Mounting Bracket (FG532-05)

NOTE

Anterus products are designed to not interfere with WiFI and Zigbee frequency spectrum used by other AMX products.

ANT-RDR Mounting/Installation

The ANT-RDR can be DIN-Rail mounted using the (optional) AC-DIN-EXTR DIN Rail Mounting Bracket (FG532-05). Refer to the documentation included with the AC-DIN-EXTR DIN for mounting instructions.

Anterus RFID Tags

The two types of RFID Tags (*ANT-TAG*, and *ANT-BDG*) are described in the following subsections:

FIG. 3 Anterus RFID Tags

RFID Tags - Internal Battery

An internal lithium battery powers the Anterus RFID Tags. Each RFID Tag will, for the duration of its life, transmit a Radio Frequency (RF) signal at a pre-set time interval. The Tag life is estimated at 5 years at a transmission time interval of approximately 10 seconds. The life span of the Tag ends when the battery life is exhausted. Battery status can be inferred by interrogating the internal Tag Age Counter Value.

NOTE

The internal lithium battery in the Anterus RFID Tags cannot be replaced.

Additional and replacement tags are available from AMX. Contact your customer service representative for details.

ANT-TAG Device/Asset Tag

The ANT-TAG Device/Asset Tag (FG5172-01) attaches to devices to identify and track location, and trigger system events (FIG. 4). .

FIG. 4 ANT-TAG Device/Asset Tag

Attach the ANT-TAG to a stationary or mobile asset to monitor the location of the asset. A tagged asset may be a non-controllable object not traditionally connected to a Master Control System, or a mobile device that is regularly moved throughout a facility.

ANT-TAG Product Specifications

ANT-TAG Specifications	
RF Specifications:	• Tx Frequency: 433 Mhz • Field strength: < 1600 µV/m • Modulation: ASK • Stability: Saw Stabilized • External Antenna
Electrical Specifications:	• Power: Internally powered Lithium Battery (non-replaceable) • Battery Life span: approximately 5 years. ***Note**: All of the Anterus RFID tags run on non-replaceable batteries, which provide approximately five years of normal use. Additional and replacement tags are available from AMX. Contact your customer service representative for details.*
Environmental:	• Operational temperature: 32º F to 140º F (0º C to 60º C) • Storage temperature: -4º F to 158º F (-20º C to 70º C) • Humidity: 5% to 90% (non condensing)
Enclosure:	• ABS (ultrasonically sealed) IP 65 • Charcoal Grey
Dimensions (HWD):	2.52" x 1.18" x .35" (64 mm x 30 mm x 9 mm)
Weight:	0.8 oz. (22.68 grams)
Certifications:	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: • This device may not cause harmful interference, and, • This device must accept any interference received, including interference that may cause undesired operation. The following standards applied in accordance with Article 5 of the directive, 1999/5/EC: • EN 300 220-1 V1.2.1 (1997-11) • ETS 300 683 (1997-03) Any modification of this device without the express consent of the manufacturer could void the user authority to operate the equipment.

ANT-TAG Mounting/Installation

ANT-TAG Tags can be mounted on a variety of non-metallic items. Where permanent fixing is required, VHB double-sided tape is used (**L-TA400**).

ANT-TAG Antenna Orientation

For optimal RF reception, the tags should be mounted in the same orientation as the antenna used on the reader. The system will still function if the orientations do no match however, the range will be decreased. It is best to mount all tags in the same orientation no matter if it matches the orientation of the antenna. The tag's vertical orientation is with the antenna of the tag facing up or down. The tag's horizontal orientation is with the antenna to the either side. FIG. 5 provides an Orientation Diagram for the ANT-RDR, and ANT-TAG:

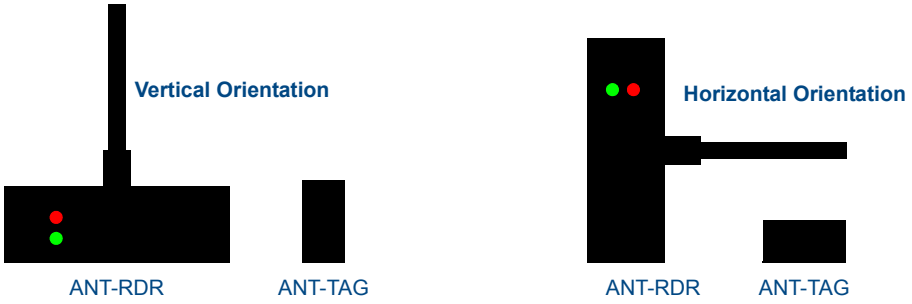

FIG. 5 ANT-RDR / ANT-TAG Antenna Orientation

ANT-BDG ID Badge Tag

The ANT-BDG badge tag (FG5172-02) is worn by personnel to identify them, track their location within a facility and trigger system events while in proximity to an ANT-RDR RFID Reader (FIG. 6).

FIG. 6 ANT-BDG ID Badge Tag

ANT-BDG Product Specifications

ANT-BDG Specifications	
RF Specifications:	• Tx Frequency: 433 Mhz • Field strength: < 1600 µV/m • Modulation: ASK • Stability: Saw Stabilized
Electrical Specifications:	• Power: Internally powered Lithium Battery (non-replaceable) • Battery Life span: approximately 5 years. ***Note**: All of the Anterus RFID tags run on non-replaceable batteries, which provide approximately five years of normal use. Additional and replacement tags are available from AMX. Contact your customer service representative for details.*
Environmental:	• Operational temperature: 32º F to 140º F (0º C to 60º C) • Storage temperature: -4º F to 158º F (-20º C to 70º C) • Humidity: 5% to 90% (non condensing)
Enclosure:	• ABS (ultrasonically sealed) IP 65 • Black
Dimensions (HWD):	3.38" x 2.12" x .19" (86 mm x 54 mm x 5mm)
Weight:	0.8 oz. (22.68 grams)
Certifications:	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: • This device may not cause harmful interference, and, • This device must accept any interference received, including interference that may cause undesired operation. The following standards applied in accordance with Article 5 of the directive, 1999/5/EC: • EN 300 220-1 V1.2.1 (1997-11) • ETS 300 683 (1997-03) Any modification of this device without the express consent of the manufacturer could void the user authority to operate the equipment.

ANT-BDG Mounting/Installation

ANT-BDG Tags can be mounted on a variety of items. Where permanent fixing is required VHB double-sided tape is used (Product number L-TA200); otherwise, the tags may be worn on a necklace or clipped to clothing.

If you will be fixing personnel photos to the ANT-BDG, use a Badge/Slot Punch capable of a throat reach of 1/4” (FIG. 7).

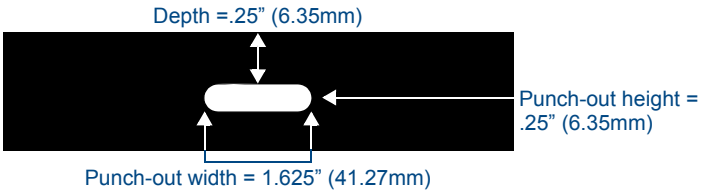

FIG. 7 ANT-BDG - Slot Punch dimensions

ANT-BDG Antenna Orientation

ANT-BDG ID Badge tags are typically worn on a necklace or clipped to clothing, which typically results in a vertical antenna orientation. There is a horizontal orientation for the ANT-BDG Tags, but it is typically reserved for installations that use the ANT-BDG Tags as windshield-mounted vehicle tags.

Signal Strength Behavior of AMX RFID Tags and Readers

The AMX RFID system tracks assets and personnel by measuring the strength of the RF signal received from a periodically transmitting badge or tag. Every reader within communication range measures the signal strength and reports it to the master controller. Most often the asset or person will be located closest to the reader reporting the strongest strength. There are, however, several environmental factors that impact the strength of the received signal. The following subsections describe these factors, present measured data, and describe the overall behavior to be expected from a system based on measurement of signal strength of a transmitted UHF radio signal.

Environmental Factors

Several environmental phenomena have potential for changing the actual received level. They are each discussed in the following sections. These effects are important to understand and keep in mind, as their net effect will typically be to make the tag appear to be farther away than it actually is. Also be aware, these factors can and do occur simultaneously and are additive in their effects.

Non-Ideal Antenna Gain

The ideal antenna would be one that transmits or receives with equal efficiency in all directions. In the real world such an antenna, with a perfectly spherical gain pattern, does not exist. Commonly used antenna types generally fall miserably short, with blind spot nulls in one or more directions. Both the badge and asset tags employ a technique referred to as diversity antennas to achieve an omnidirectional pattern that is much closer to the ideal, but still not quite the ideal perfect sphere. The reader antenna, when oriented vertically, has a doughnut-shaped pattern, receiving equally well in all directions in a horizontal plane. It has substantial blind spots when trying to receive from above or below, so it is important to keep the reader antenna vertical if all tags to be read are on the same floor of a facility.

Antenna Elevation

RF signal strength loss is affected by the elevation of both the transmitting and receiving antennas above ground. In general, if either or both ends are close to the floor the received signal will be weaker. This is especially pronounced at greater distances. FIG. 8 illustrates this phenomenon. Thus, if maximum range is required by a specific application the readers should be mounted at least a couple meters above the ground.

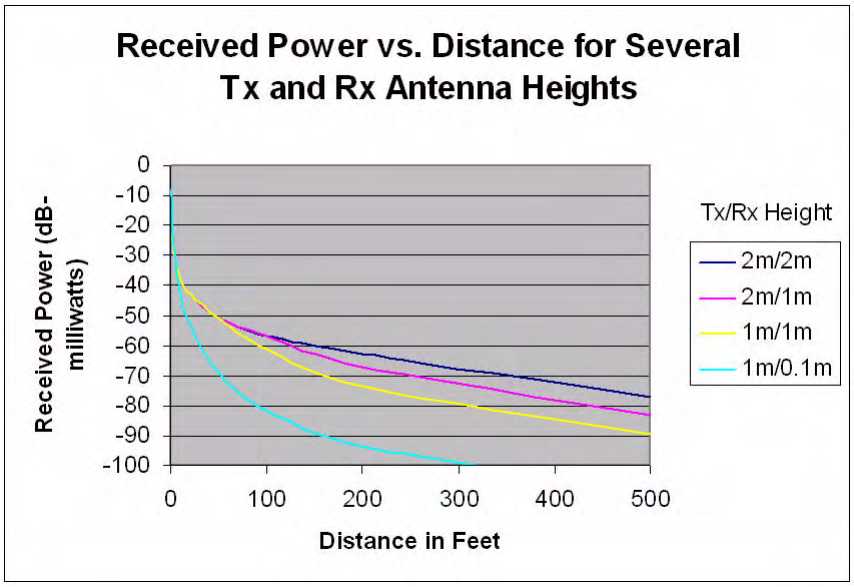

FIG. 8 Antenna Height Influence on Received Signal Strength

People and Objects

When radio signals pass through materials other than air their strength is typically reduced more than passing through the same distance in air. The amount of additional decrease depends on the type of material. The loss through most dry non-metallic materials is only moderate. Loss through many liquids is greater. It is because the human body is composed mostly of water that radio signals will be reduced if a person is wearing an RFID badge and facing away from the reader. Radio signals cannot pass through solid metal objects and surfaces at all but generally, through reflections, can find their way around them.

Contact between a badge or tag and a person or object will also have some effect on the signal strength radiated outward, in the direction away from the person or object. This occurs when the signal reflected from the body or object adds to or subtracts from the one radiated directly outward.

Multipath Fading

This is an environmental phenomenon you've probably experienced while driving your car and listening to the radio. You pull up to a stop sign and your station suddenly gets weak or disappears. You pull forward as little as a few inches and the station immediately comes back strong and clear. You just experienced a multipath fade. Because of reflections, radio signals can take many paths to get from the transmitting antenna to the receiving antenna. When two or more copies of the signal from different paths arrive at the receiving antenna they can either add to each other or cancel each other. The addition is quite limited in how much the signal can be boosted but the cancellation can, in the worst case, make the signal completely disappear. Fortunately this complete cancellation rarely happens and is likely to be brief in duration. The use of diversity antennas in badges and asset tags provide some mitigation of this phenomenon but cannot completely eliminate it. If diversity antennas were not used, it would be a common occurrence for the signal strength to be near zero in as short a range as 10 feet.

Analysis

Given the transmitted power and antenna characteristics, it is a straightforward mathematical calculation to predict what the received signal strength can be when no environmental effects are present. This calculation is plotted in the graph shown on the next page as the heavy black line. In general, this estimates the best case signal strength, as environmental effects have much higher potential for reducing the received signal strength than increasing it. The antenna heights are assumed to be 2 meters on both ends.

Measured Data

Signal strength data was recorded from a population of 4 readers and 19 badges and asset tags at 10, 50, 100, and 200 feet. Data was taken with the badges and tags in several different orientations to take into account the variations in badge and tag antenna radiation patterns.

The data is represented in FIG. 9 (next page) as blue vertical bars showing the total range of the recorded data.

Conclusions

Two basic conclusions can be made from examining FIG. 9:

First, a very strong signal implies the person or object is very close to the reader. This is simply due to the fact that it is impossible to receive a strong signal from far away.

Second, a tag with a weak signal is likely to be far away, but can also be near due to reductions in strength that can come from one or more of the environmental factors described above.

For example, for a reading of 150, the distance between reader and tag is almost certainly less than or equal to 20 feet. A tag at 20 feet is likely to have a signal strength reading between 150 and 70, and possibly weaker if the tag's view is obstructed.

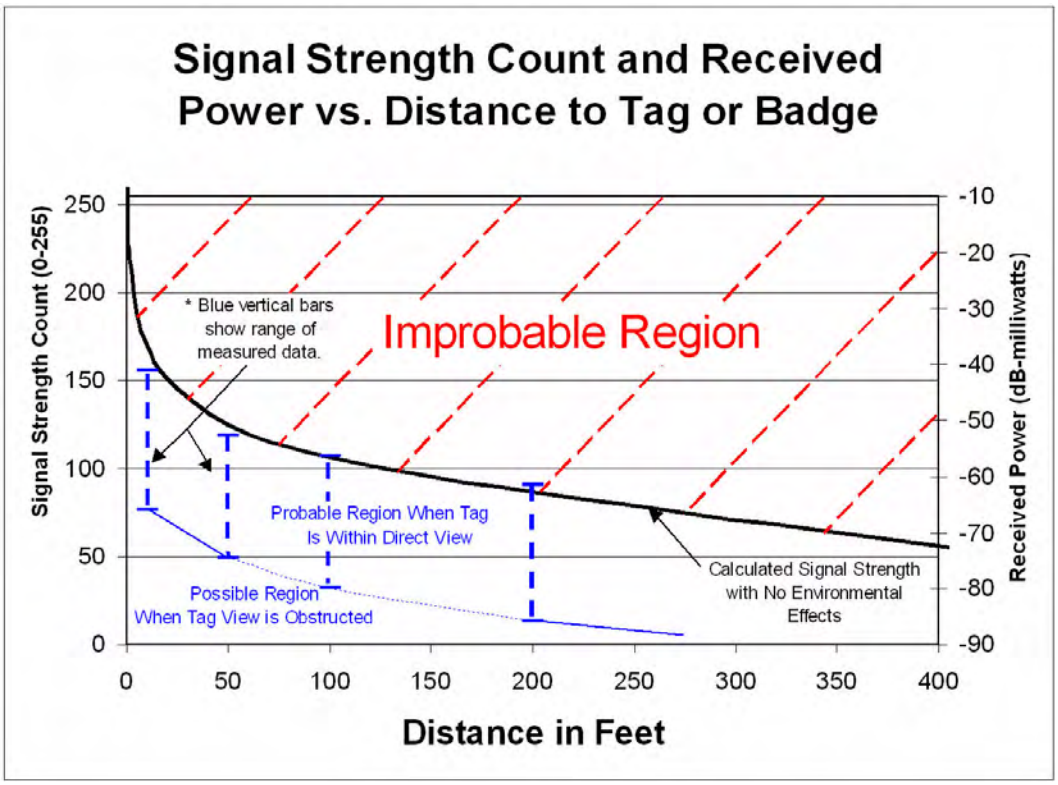

FIG. 9 Signal Strength Count Behavior

Installation

Overview

Installation and configuration of the Anterus solution includes connecting the ANT-RDR Reader to the NetLinx Master via AxLink, and using the ANT-RDR's built-in web interface to name each RFID tag, and specify communications and security settings.

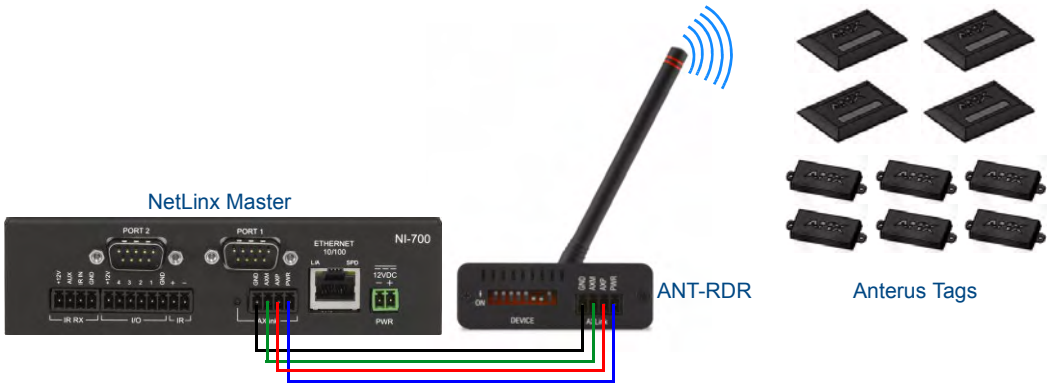

FIG. 10 Basic Anterus System

Connecting the ANT-RDR To a NetLinx Master

The ANT-RDR uses a single 4-pin captive-wire AxLink port to connect the ANT-RDR to a NetLinx Master, and (optionally) to other ANT-RDRs. To connect the ANT-RDR to the NetLinx Master via AxLink, install the AXlink data/power bus wiring as shown in FIG. 11.

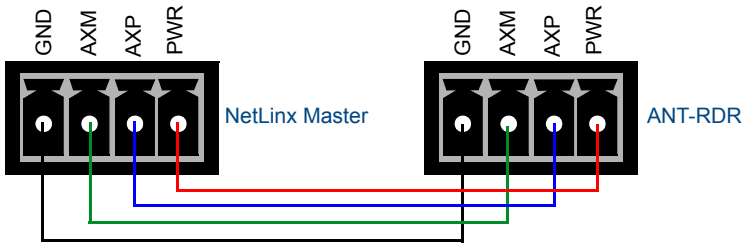

FIG. 11 AXlink data/power connections

Connecting Additional ANT-RDRs

To connect additional ANT-RDRs to create a RFID Reader Network Group, follow the standard AxLink bus wiring (FIG. 12).

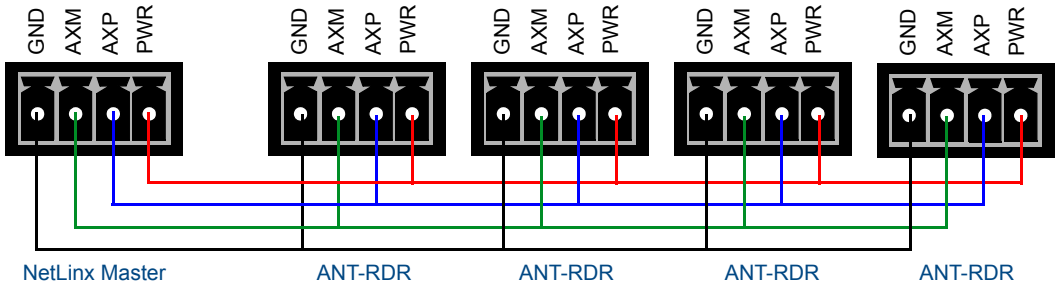

FIG. 12 Connecting Additional ANT-RDRs

Wiring Guidelines

The interface requires a 12 VDC power to operate properly. The interface uses a PSN2.8 power supply. The Central Controller supplies power via the AXlink cable or external 12 VDC power supply. The maximum wiring distance between the Central Controller and interface is determined by power consumption, supplied voltage, and the wire gauge used for the cable.

Cable Types and Maximum Distances

Compatible AXlink cable types include those manufactured by Liberty Wire & Cable Inc., and cables that comply with Category 5 or Belden 8102 standards. To determine the maximum distances, refer to*Power Distribution* section on page 12.

Pre-manufactured AXlink cable

The Liberty Wire & Cable Inc. manufactures AXlink cable that contains two pairs of conductors. The data pairs comprise 22 AWG stranded shielded twisted pair (STP) with a single drain wire, and a 12 VDC power pair of 18 AWG stranded wire. The nominal capacitance between the data conductors is 12.5 pF/ft.

Using the Liberty Wire & Cable Inc. AXlink cable, the maximum overall cable distance between the Central Controller and all external devices for data communication is 3,000 feet with no remote power.

You can contact Liberty Wire & Cable Inc. at 4630 Forge Road, Suite A, Colorado Springs, CO 80907 or by calling (800) 530-8998.

Power Distribution

The following table lists the maximum cable lengths by electrical current and wire gauges (AWG). These distances are based on a min. of 13.5 volts available at the Central Controller's power supply.

Maximum AXlink current and cable lengths by wire AWG				
Maximum Current	**Cable length by wire AWG**			
Milliampere (mA)	**18 AWG**	**20 AWG**	**22 AWG**	**24 AWG**
50	2,347	1,485	926	584
100	1,174	743	463	292
250	469	297	185	117
500	235	149	93	58
1,000	117	74	46	29

Calculating AXlink wiring distances

All AXlink devices require a minimum of 12 VDC power to operate properly. The power can be supplied by the Central Controller's AXlink cable (remote power configuration) or with an optional 12 VDC power supply (local power configuration). The maximum wiring distance between the power supply and AXlink device is determined by power consumption, supplied voltage, and the wire gauge used for the cable. Use the three-step formula below to calculate the maximum wiring lengths allowable between the Central Controller and external AXlink devices.

Most power supplies are factory set to 13.5 VDC. Never use a power supply that exceeds 18 VDC for remote or local power configurations. Contact AMX for a complete list of products and their power consumption ratings.

To calculate the AXlink wiring distance formula for data and power:

1. <Total current consumption of all device's on AXlink cable> *<wire resistance per foot> * 2 = <voltage drop per foot>. ***See tables below for the Wire Resistance/Foot values.***
2. <Power supply voltage> - 12 VDC = <surplus voltage dissipation for cable run>.
3. <Surplus voltage dissipation for cable run> / < voltage drop per foot > = Maximum distance in feet.

The following table lists the resistance factors used in the formula.

Gauge/resistance factors - Solid Copper Wiring	
Wire gauge	**Wire Resistance/foot**
18 AWG	.00639
20 AWG	.0101
22 AWG	.0162
24 AWG	.0257

NOTE

For further details on AxLink Wiring, refer to the AXlink Wiring Considerations Instruction Manual (available online at www.amx.com).

Assigning the ANT-RDR Device Address

The ANT-RDR sets its AXLink address via the 8-position DEVICE DIP switch located on the rear panel (FIG. 13).

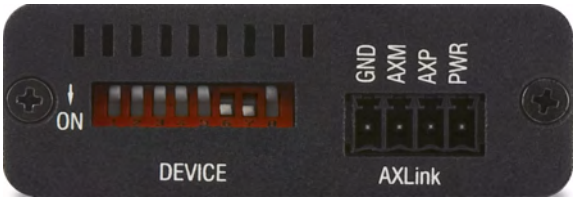

FIG. 13 Device DIP Switch

- The AXLink address distinguishes a device on the AXLink bus from other devices. Care should be taken by the system integrator not to assign duplicate AXLink addresses to multiple devices.
- AXLink addresses must be in the range of 1 to 255 (address 0 belongs to the Master).
- As indicated on the device, flip each switch **down** for the ON position.

Device DIP Switch Settings								
Position	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Value	1	2	4	8	16	32	64	128

For example, the DIP switch shown in FIG. 13 defines Device 96 (switches 6 and 7 = ON).

NOTE

The device number takes effect only upon power-up. If you later change the device number, remove and reconnect the AXlink connector to enter the new device number into memory.

Anterus Configuration Manager

Overview

The Anterus Duet Module interfaces ANT-RDR Readers with NetLinx controllers, and adds the Anterus Configuration Manager to the NetLinx Master's built-in web console. The Anterus Configuration Manager allows you to configure the Reader and all Tags in the Anterus solution via a web browser on any PC that has access to the NetLinx Master to which the ANT-RDR is connected.

A sample UI module and a touch panel file are provided in the module package. These are not intended to cover every possible application, but can be expanded as needed to meet the requirements of a particular installation. Refer to the documentation supplied with the Anterus Duet Module for more details.

NOTE

The Anterus solution will also work without the Duet module, and all web configuration may be done with Send Commands, Channels and Levels. Refer to the Programming section on page 27 *for detailed programming information.*

Accessing the RFID Configuration Manager

From any PC that has access to the LAN that the NetLinx Master to which the ANT-RDR is connected:

1. Open a web browser and type the **IP Address** of the target NetLinx Master in the browser's Address Bar.
2. Press **Enter** to access the Configuration Manager for the specified NetLinx Master.

NOTE

If the specified NetLinx Master requires authentication, you will have to provide a valid Username and Password to proceed.

3. The initial view is the Master's *Master Configuration Manager* page - *WebControl* tab (FIG. 14).

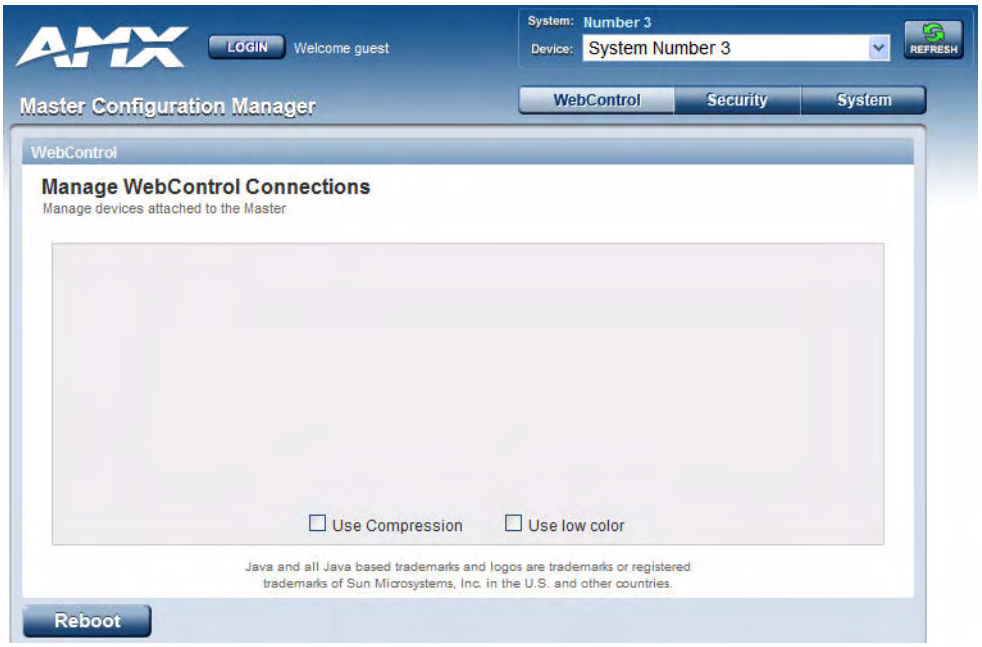

FIG. 14 Master Configuration Manager page - WebControl tab

4. Click the **System** button to access the *Manage System* page. The initial view is of the *Manage System* tab (FIG. 15).

FIG. 15 Manage System page - Manage System tab

5. Open the *Manage Devices* tab (FIG. 16).

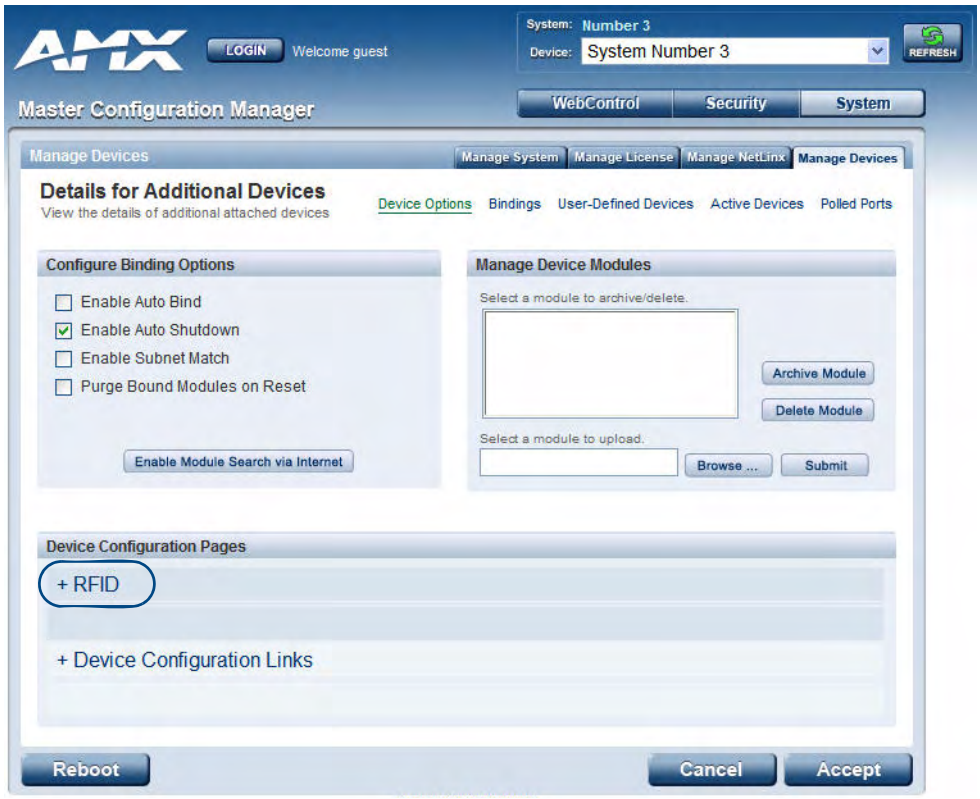

FIG. 16 Manage System page - Manage Devices tab

6. Under *Device Configuration Pages*, click on **RFID**, then select **AMX Anterus** (FIG. 17).

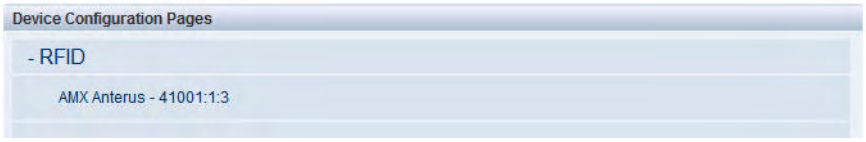

FIG. 17 Manage Devices tab - Device Configuration Pages options

This opens the RFID Configuration Manager (Main page).

RFID Configuration Manager (Main page)

The first web configuration page to be displayed when the ANT-RDR Web Console is accessed is the *RFID Configuration Manager* page (FIG. 18).

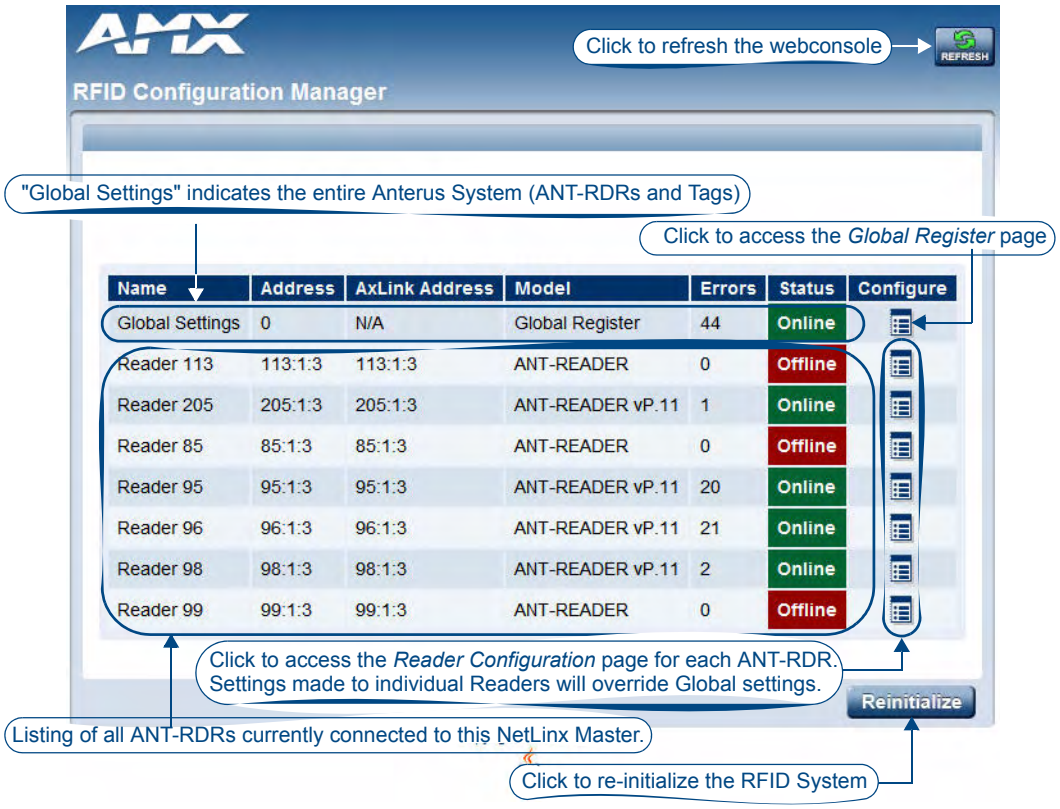

FIG. 18 RFID Configuration Manager - Main Page (initial view)

The options in this page allow you to view and configure the Anterus system (Readers and tags) as a whole (Global Settings), as well as view and configure each ANT-RDR Reader in the system individually. Configuration options include naming each ANT-RDR, and managing each of the RFID Tags in the system.

This page provides basic information on the entire Anterus System (in the *Global Settings* row), as well as for each ANT-RDR connected to the NetLinx Master:

RFID Configuration Manager	
• **Name**	Displays the Name assigned to each ANT-RDR. Reader Names can be changed, via the Reader Configuration page - see the *Reader Configuration Pages* section on page 24. ***Note**: The "Global Settings" name cannot be changed.*
• **Address**	Displays the device address assigned to each ANT-RDR. Reader Addresses can be changed, via the Reader Configuration page - see the *Reader Configuration Pages* section on page 24. ***Note**: The "Global Settings" address of zero (0) cannot be changed.*
• **AxLink Address**	Displays the AxLink device address assigned to each ANT-RDR, as it was specified on each ANT-RDR via the 8-position DIP Switch on the rear panel (see the *Assigning the ANT-RDR Device Address* section on page 13). ***Note**: AxLink Device Address does not apply to "Global Settings" (n/a).*
• **Model**	Displays the Model name assigned to each ANT-RDR (read-only).
• **Errors**	This column indicates any errors detected by the NetLinx Master, for each ANT-RDR. These errors are indicated by code numbers.
• **Status**	Indicates the status of each ANT-RDR (*Online* or *Offline*).
• **Configure**	• Click the icon in the *Global Settings* row to access the *Global Register* page. Use the options in this page to specify global (system-wide) configuration options, as well as add and remove RFID Tags from the system. See the *Global Register Page* section on page 19 section for details. • Click the icons in this column to access configuration options for the selected ANT-RDR. See the *Reader Configuration Pages* section on page 24 section for details.

Global Register Page

Click the Configure icon in the *Global Settings* row (at the top of the *RFID Configuration Manager* page - see FIG. 18) to access the *Global Register* page shown in FIG. 19:

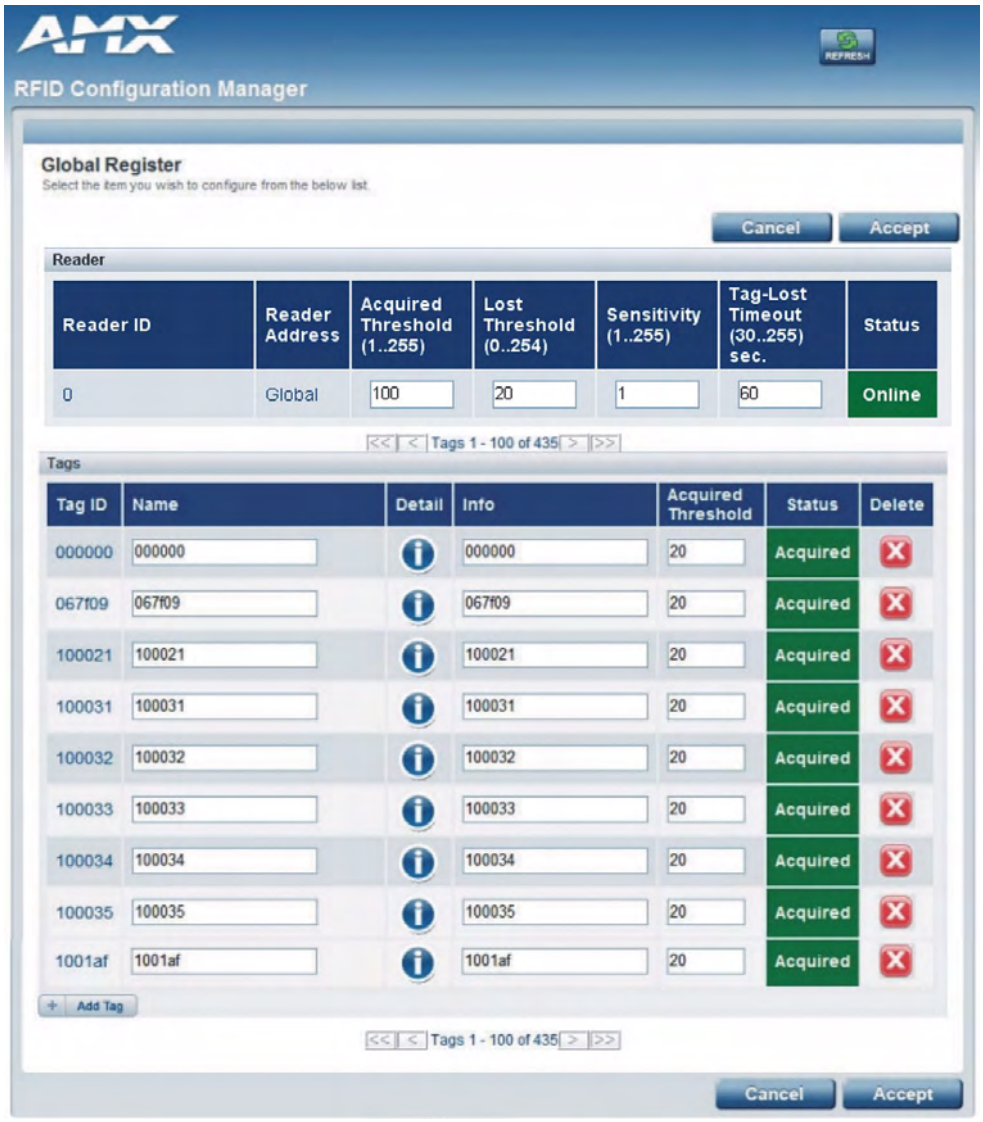

FIG. 19 Global Register Page

The options on the Global Register page allow you to view/edit global RFID Reader settings, and add/delete RFID Tags in the system.

Global Reader Configuration Options

The top section of the *Global Register* page contains ANT-RDR configuration options (FIG. 20):

FIG. 20 Global Register page - Global Reader Configuration Options

- These options apply to ALL ANT-RDR Readers in the system. Use the options in this page to set global defaults for all Readers and Tags in the Anterus system.
- Settings made to individual Readers via the *Reader Configuration* Pages (see the *Reader Configuration Pages* section on page 24) will override these global settings.

Global Register page - Global Reader Configuration Options	
• **Reader ID:**	Indicates the Device ID for the selected ANT-RDR. In the *Global Registery* page, the Reader ID is always zero (0), and cannot be changed.
• **Reader Address:**	Indicates the AxLink Device Address for the selected ANT-RDR. In the *Global Registery* page, the Reader ID is always "*Global*", and cannot be changed.
• **Acquired Threshold (1...255):**	The ANT-RDR will notify the Master that a Tag's signal has been acquired when its RSSI signal is above the *Acquired Threshold* value. • The allowed range is 1 (min.) to 255 (max) • Default = 200
• **Lost Threshold (0...254):**	The ANT-RDR will notify the Master that a Tag's signal has been lost when its RSSI signal is below the *Lost Threshold* value. • The allowed range is 0 (min.) to 254 (max) • Default = 50
• **Sensitivity (1...255)**	The *Sensitivity* setting is used to reduce the message traffic between the ANT-RDR and the Master: The ANT-RDR remembers the last RSSI value sent to the Master for each Tag it has acquired. On the next poll, only Tags whose current RSSI value is outside the range of the last sent RSSI value +/- the *Sensitivity* value entered here will be sent to the Master. • The allowed range is 1 (min.) to 255 (max) • Default = 30
• **Tag-Lost Timeout (30...255 seconds)**	Use this option to specify the period time allowed to continue monitoring Tags whose RFID signal has dropped below the level specified in the Lost Threshold. • If a Tag's RSSI signal has dropped below the *Lost Threshold* level, and is re-acquired by the Reader within the time period specified here, it will automatically resume normal functionality. • Conversely, if a Tag's RSSI signal drops below the *Lost Threshold* level, and is not re-acquired within the specified time period, the Reader will no longer monitor for that Tag. Therefore, once the timeout period has elapsed, the Tag will not be automatically re-acquired, and must be manually re-entered into the system. • Default = 30 seconds.
• **Status (Online/Offline)**	Indicates the current status of the selected ANT-RDR (display-only).

Adding a Tag to the System

1. Click the **Add Tag** button in the bottom-left corner of the *Global Register* page (FIG. 21) to add a new RFID Tag to the system.

FIG. 21 Add Tag button

This invokes a set of fields for the new Tag at the bottom of the page (FIG. 22):

FIG. 22 New tag fields

2. Enter a **Tag ID**.
3. Enter a Tag **Name**.
4. Enter Tag **Info**.
5. Enter the desired **Acquired Threshold** value for the new tag.
6. Click on the **Accept** button to enter the newly defined tag into the Anterus system.

Removing a Tag from the System

In either the *Global Register* Page or the *Reader Configuration* Page (see below), click on the **Delete** icon for any Tag (see FIG. 23 on page 22). Once deleted, the Tag is permanently removed from the system.

Anterus Tags Configuration Options

The lower section of the *Global Register* page contains Tag configuration options. There is a separate entry for each Tag in the Anterus system (FIG. 20):

FIG. 23 Tag Configuration Options (Global Register page)

Tag Configuration Options (Global Register page)	
• **Tag ID:**	Indicates the Tag ID assigned to each Tag (display-only).
• **Name:**	Use this field to assign a friendly name to each Tag (optional). Click the **Accept** button to save your changes.
• **Detail:**	Click the Detail icon to access a popup window containing detailed info (read-only) on the selected Tag (see the *Viewing Tag Details* section on page 23).
• **Info:**	Use this field to assign a descriptive string to each Tag (optional). Click the **Accept** button to save your changes.
• **Acquired Threshold:**	The Tag's *Acquired Threshold* value works in conjunction with the Reader's *Acquired Threshold* setting, and can be used to further filter active RFID Tag messages (via the Reader's *Filter Tag Levels* option). ***Note**: The Tag's Acquired Threshold value does not override filtering already configured on the Reader.* Click the **Accept** button to save your changes.
• **Status (Acquired/Offline):**	Indicates the current status of the selected Tag (display-only). • *Acquired* indicates that the Tag has been detected by the Reader and is currently being tracked by the RFISD Reader. • *Offline* indicates that the Tag has moved out of range, and is currently below the Acquired Threshold
• **Delete:**	Click to remove any Tag from the Anterus system (see the *Removing a Tag from the System* section on page 21).
• **Add Tag:**	Click to add a new Tag to the system (see the *Adding a Tag to the System* section on page 21).

Viewing Tag Details

Click on the Details icon for any Tag to invoke a popup window containing details for that Tag (FIG. 24):

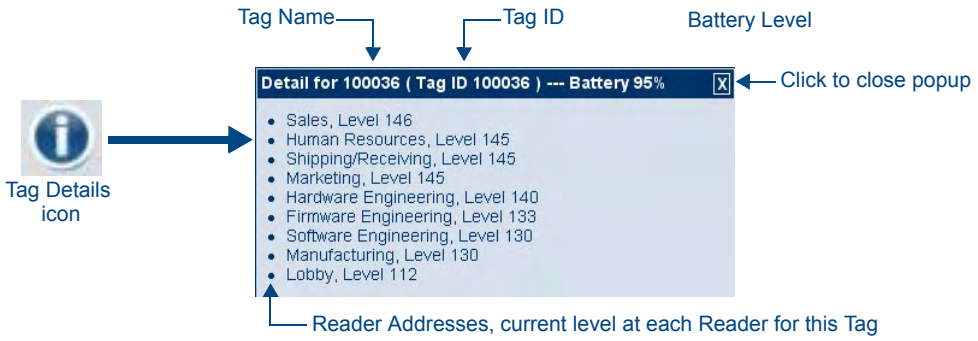

FIG. 24 Tag Details Popup

The Tag Details popup displays various data about the selected Tag.

- The title bar of the popup window indicates the Tag Name, Tag ID, and the Tag's current Battery Level.
- The main area of the popup lists the addresses of each Reader that is currently detecting the selected tag, followed by the current Tag level for each Reader (for this Tag).

Reader Configuration Pages

Click the *Configure* icon for any Reader in the *RFID Configuration Manager* page - see FIG. 18 on page 17) to access the *Reader Configuration* page shown in FIG. 25:

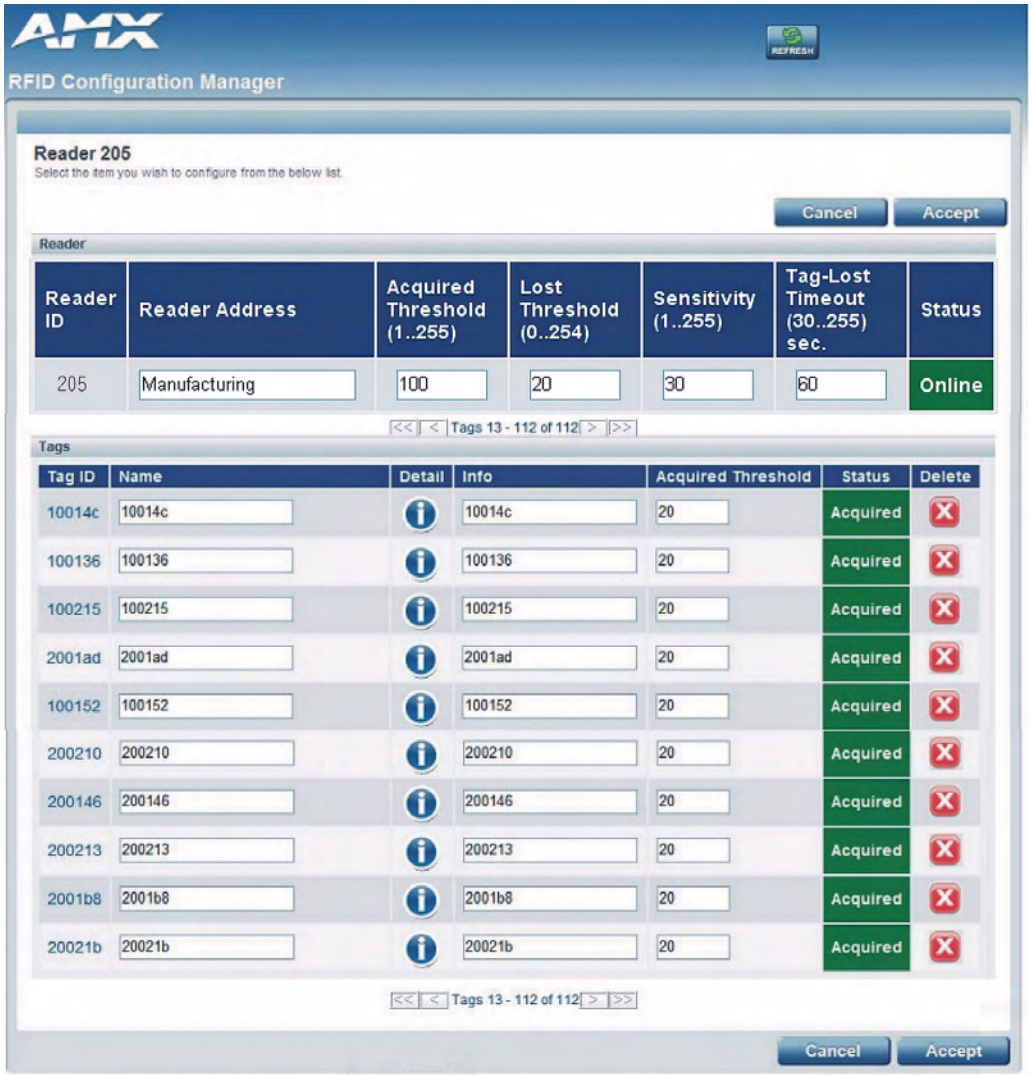

FIG. 25 Reader Configuration Page (with "Reader 205" selected)

NOTE

The Reader configuration options on this page are identical to those presented on the Global Register page (see FIG. 19 on page 19).
The difference between the two is that the options on the Reader Configuration page are specific to the ANT-RDR selected on the RFID Configuration Manager (Main page).
Settings made to a specific ANT-RDR (in the Reader Configuration page - FIG. 25) will override the Global settings made in the Global Registry page.

Reader Configuration Options

The top section of this page provides configuration options for the selected ANT-RDR:

FIG. 26 Reader Configuration Options

Reader Configuration Page	
• **Reader ID:**	Indicates the Device ID for the selected ANT-RDR, as specified via the
• **Reader Address:**	Indicates the AxLink Device Address for the selected ANT-RDR. In the *Global Registery* page, the Reader ID is always "*Global*", and cannot be changed.
• **Acquired Threshold (1...255):**	The ANT-RDR will notify the Master that a Tag's signal has been acquired when its RSSI signal is above the *Acquired Threshold* value. • The allowed range is 1 (min.) to 255 (max) • Default = 200
• **Lost Threshold (0...254):**	The ANT-RDR will notify the Master that a Tag's signal has been lost when its RSSI signal is below the *Lost Threshold* value. • The allowed range is 0 (min.) to 254 (max) • Default = 50
• **Sensitivity (1...255)**	The *Sensitivity* setting is used to reduce the message traffic between the ANT-RDR and the Master: The ANT-RDR remembers the last RSSI value sent to the Master for each Tag it has acquired. On the next poll, only Tags whose current RSSI value is outside the range of the last sent RSSI value +/- the *Sensitivity* value entered here will be sent to the Master. • The allowed range is 1 (min.) to 255 (max) • Default = 30
• **Tag-Lost Timeout (30...255 seconds)**	Use this option to specify the period time allowed to continue monitoring Tags whose RFID signal has dropped below the level specified in the Lost Threshold. • If a Tag's RSSI signal has dropped below the *Lost Threshold* level, and is re-acquired by the Reader within the time period specified here, it will automatically resume normal functionality. • Conversely, if a Tag's RSSI signal drops below the *Lost Threshold* level, and is not re-acquired within the specified time period, the Reader will no longer monitor for that Tag. Therefore, once the timeout period has elapsed, the Tag will not be automatically re-acquired, and must be manually re-entered into the system. • Default = 30 seconds.
• **Status (Online/Offline)**	Indicates the current status of the selected ANT-RDR (display-only).

The lower section of this page provides configuration options for each Tag assigned to this Reader:

Tag Configuration Options (Reader Configuration Page)	
• **Tag ID:**	Indicates the Tag ID assigned to each Tag (display-only).
• **Name:**	Use this field to assign a friendly name to each Tag.
• **Detail:**	Click the Detail icon to access a popup window containing detailed info on the selected Tag (see the *Viewing Tag Details* section on page 23).
• **Info:**	Use this field to assign a descriptive string to each Tag.
• **Acquired Threshold**	The Tag's *Acquired Threshold* value works in conjunction with the Reader's *Acquired Threshold* setting, and can be used to further filter active RFID Tag messages (via the Reader's *Filter Tag Levels* option). ***Note**: The Tag's Acquired Threshold value does not override filtering already configured on the Reader.*
• **Status (Acquired/Offline):**	Indicates the current status of the selected Tag (display-only). • *Acquired* indicates that the Tag has been detected by the Reader and is currently being tracked by the RFID Reader. • *Offline* indicates that the Tag has moved out of range, and is currently below the Acquired Threshold
• **Delete**	Click to remove any Tag from the ANterus system.

The Tag configuration options on this page are identical to those presented on the Global Register page (see FIG. 19 on page 19).
Settings made to a specific Tag (in the Reader Configuration page - FIG. 25) will override the Global settings made in the Global Registry page.

Programming

Anterus Duet Module - Overview

The COMM module translates between the standard interface described below and the device protocol. It parses the buffer for responses from the device, sends strings to control the device, and receives commands from the UI module or telnet sessions.

Refer to the documentation supplied with the Anterus Duet Module for more details.

A sample UI module is provided in the module package. It is not intended to cover every possible application, but can be expanded as needed by a dealer to meet the requirements of a particular installation.

Implementing the Anterus Duet Module

To interface to the **AMX_Anterus_Comm_dr1_0_0.jar** module:

1. Define the device ID for the UPS that will be controlled.
2. Define the virtual device ID that the AMX_Anterus_Comm_dr1_0_0 COMM module will use to communicate with the main program and User Interface.
   Duet virtual devices use device numbers 41000 - 42000.
3. If a touch panel interface is desired, a touch panel file **AMX_Anterus.TP4** and module **AMX_Anterus_UI.axs** have been created for testing.
4. The Duet AMX_Anterus_Comm_dr1_0_0 module must be included in the program with a DEFINE_MODULE command.

   This command starts execution of the module and passes in the following key information: the device ID of the UPS to be controlled, and the virtual device ID for communicating to the main program.

   An example is shown below.

```
DEFINE_DEVICE

dvAnterus      = 96:1:0          (* AxLink. Main RFID reader *)
vdvAnterus     = 41001:1:0       (* Virtual Device *)
dvTP           = 10001:1:0       // TP

DEFINE_VARIABLE                 //Define arrays of button channels used on your own
                                  touch panel
integer nBUTTONS[]={1,2,3,4,5,6,7}

DEFINE_START                   // Place define_module calls to the very end of the
                                  define_start section.

DEFINE_MODULE 'AMX_Anterus_Comm_dr1_0_0' Comm(vdvAnterus,dvAnterus)
DEFINE_MODULE 'AMX_Anterus_UI' UI(vdvAnterus,dvTP,nBUTTONS)
```

Since this API will communicate with a system of RFID readers, you must specify the AxLink device numbers used by your install followed by a REINIT command in order to start communicating, like so:

```
DEFINE_EVENT
DATA_EVENT[vdvAnterus]
{
      ONLINE:
      {
            SEND_COMMAND vdvAnterus,'PROPERTY-Identifiers,97;98;99'
            SEND_COMMAND vdvAnterus,'REINIT'
      }
}
```

Port Mapping

This module uses a single virtual device:

Port Mapping			
Virtual Device	**Channels**	**Control**	**Feedback**
41001:1:0 - Main	All	All	All

Channels

The channels supported by the COMM module are listed below. These channels are associated with the virtual device(s) and are independent of the channels associated with the touch panel device.

Virtual Device Channel Events	
Channel	**Description**
251	ON: Device communicating (feedback only) OFF: Device not communicating (feedback only)
252	ON: Data initialized (feedback only) OFF: Data not initialized (feedback only)

NetLinx Send Commands

There are two sets of NetLinx Send Commands supported by the COMM module, one set of Control commands and one set of Feedback commands.

Refer to the documentation supplied with the Anterus Duet Module for a full listing and description of supported NetLinx commands, as well as Installer Tips, Naming Conventions, Programming Notes, etc.

AxLink Programming Overview

The Anterus solution will also work without the Duet module, and all web configuration may be done with Send Commands, Channels and Levels.

Send Commands

The Anterus solution supports the AxLink Send Commands commands listed below. Note command messages either do not have a response, or are responded to with a COMMAND - not a string.

Send Commands	
RSSI Threshold	The RSSI Upper and Lower Thresholds will be sent from the Master to the ANT-RDR in a level update message as described in the *AXLink Levels* section on page 31. • The level value is equivalent to the RSSI value with range 0 to 255.
RSSI Sensitivity Range	The RSSI Upper and Lower Thresholds will be sent from the Master to the ANT-RDR in a level update message as described in the *AXLink Levels* section on page 31. • The level value is equivalent to the RSSI value with range 0 to 255.

Send Commands (Cont.)	

?AP
Auto Poll Time
	The Tags actively transmit, and the Reader picks them up and stores them into an event cue. "Auto poll" tells the Reader how often to read the cue.
	The ANT-RDR device will enable its auto poll feature when Channel 139 is ON and disable the auto poll feature when Channel 139 is OFF.
	• Range = 50 to 6000 milliseconds (ms)
	• Default = 2000 ms
	Response: `AP <MLSEC>`
	Where:
	• `MLSEC`: mlsec in the polling interval (Range = 50 - 6000 ms).
	Examples:
	`SEND_COMMAND '?AP`
	Master requests current auto poll time interval.
	`SEND_ COMMAND 'AP 5000`
	Master set, or ANT-RDR report, auto poll time interval is 5 sec.

?TG
Tag Information
	The Tag Information (TG) command is sent by the Master to request the current Tag status on the ANT-RDR.
	***Note**: This command will only report status on Tags that pass through the Reader Filters.*
	The Tag message may contain information about more than one Tag bounded by the maximum length of an AXLink message (64 bytes).
	Response: `TG [T<TID> R<RSSI> P<LIFE> A<AFLG> B<FUT> …]`
	Where:
	• `TID`: The tag's unique *Tag ID*, an 8 character string formatted such that a tag's type can be identified by the first character.
	• `RSSI`: *RSSI strength value* of tag's transmission (Range = 0 - 255, where 0 = no signal, and 255 = max RSSI signal possible).
	• `LIFE`: The *Percent of Battery Life* left on the Tag (0 - 100%).
	• `AFLG`: *Activity Flag*, a single byte denoting if the tag has just crossed the *Acquired Threshold* and been acquired; just crossed the *Lost Threshold* and is lost, or the change in RSSI value since the last sent Tag RSSI value is greater than the *Sensitivity* range. Values are:
	2 for acquired,
	1 for RSSI value change,
	0 for lost.
	• `FUT`: *Future Flag*, a single byte to be populated in the future to signal an alert when tags include tamper proof indicators or to signal a push and release event when tags are created with a button. In this release will be set to 0.
	Examples:
	`SEND_COMMAND '?TG`
	Master requests the current tag status on an ANT-RDR
	`SEND_ COMMAND 'TG`
	ANT-RDR has no tags to report
	`SEND_ COMMAND 'TG T12345678 R45 P25 A2 B0 T87654321 R234 P80 A1 B0`
	ANT-RDR reports information from 2 tags:
	• TagID:12345678 RSSI:45 battery:25% has just been acquired;
	• TagID:87654321 RSSI:234 battery:80% has changed RSSI value

Send Commands (Cont.)	

?ER
Error Command
	The Error Command (ER), command is sent by the Master to request the number of invalid tags reads encountered by the ANT-RDR.
	The ANT-RDR will respond with the number of invalid tags reads, then it will clear the invalid read count.
	***Note**: The **?ER** command does not care why there are invalid tag reads; it just keeps count until it gets to a certain number and then it is cleared.*
	• Response: `ER <NUMERR>`
	Where:
	• `NUMERR`: the number of invalid tags reads encountered by the ANT-RDR since the last `?ER` request.
	Examples:
	`SEND_COMMAND '?ER`
	Request number of invalid tags reads
	`SEND_ COMMAND 'ER 5`
	Report 5 invalid tags reads since last `?ER` request.

VER Request firmware version	This command is a request for the firmware version. In response, the device sends a command in the form of 'vX.XX' (e.g. v1.02) to the Master.

AXLink Channels

Whenever communications with a Master is established, the Master assumes the ANT-RDR is at the default channel status. Default channel status assumed by the Master is all Channels are OFF. However, the ANT-RDR may not be in this default state and needs to inform the Master by sending an update for each channel that is ON. After the ANT-RDR reports its Device ID to tell the Master it is online, the ANT-RDR should begin to update the Master with any channels that are currently on.

The Guardian Channels are defined below:

AXLink Channels			
Channel	**Type**	**Function**	**Description**
1-138		Not Used	
139	CMD/FDBK	Auto Poll	The ANT-RDR device will enable its auto poll feature when the channel is ON and disable the auto poll feature when the channel is off.
140-255		No Used	

*The **Type** column denotes who initiates the channel change. The Master directs the ANT-RDR to change its state through channels with type CMD. The ANT-RDR informs the Master of state changes through channels with type FDBK. Some channels can be used for both CMD and FDBK.*

AXLink Levels

Levels are a means of applying a value to a physical element on the device. The ANT-RDR supports 8-bit levels only with values from 0-255 to represent RSSI values.

When a device comes ONLINE, the Master assumes the device is at the default level status with all levels set to 0. However, the ANT-RDR may not be in this default state and needs to inform the Master the value of any non-zero level.

After a 'LEVON' command is received from the Master the ANT-RDR sends a level update for any levels that are non-zero.

AXLink Levels

Level	Type	Function	Description
1	CMD/FDBK	RSSI Upper Threshold	The ANT-RDR will notify the Master that a tag's signal has been acquired when its RSSI signal is above the Upper Thresholds. • Range = 0-255, with 0 denoting the maximum range where a tag can be acquired.
2	CMD/FDBK	RSSI Lower Threshold	The ANT-RDR will notify the Master that a tag's signal has been lost when its RSSI signal is below the Lower Thresholds. • Range = 0-255, with 0 denoting the maximum range where a tag can be active before its signal is lost.
3	CMD/FDBK	RSSI Sensitivity Range	The ANT-RDR will notify the Master that a tag's signal has changed when the current RSSI value is outside the range of the last sent RSSI value +/- the Sensitive Range. • Range = 0-255, with 0 being maximum sensitivity.
4	Unused	Unused	Unused
5	Unused	Unused	Unused
6	Unused	Unused	Unused
7	Unused	Unused	Unused
8	Unused	Unused	Unused

*The **Type** column denotes who initiates the level change. The Master directs the ANT-RDR to change its state through Level of type CMD. The ANT-RDR informs the Master of state changes through Levels of type FDBK*

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